Ampère's Rule

BEGINNERS are certainly, as Herr Daehne says (NATURE, June 24, p. 168), liable to get a little "mixed" in reference to the above *mem. technica;* chiefly, I think, for want of some idea sufficiently prominent to fix itself on the mind to the exclusion of others.

I have found the following slight modification of the original rule pretty easily remembered and applied.

It may be taken as agreed—

(1) That the *head* is more important ("more worthy," as the old grammars put it) than the *feet*.

No one except an acephalous mollusk will deny this; and *it* is not a fair judge.

(2) That the *right* hand is more important than the left hand.

The left-handed people are a mere minority (and a nuisance at cricket); and minorities are, according to modern Radical ideas, "une quantité négligeable."

3. That the N-seeking pole is that part of the compass-needle to which attention is mainly directed.

Now,—If a person places himself so as to face the needle, and a current goes from HEAD to foot, the N-SEEKING pole moves to his RIGHT hand.

This is practically the form in which the rule is given in Prof. Balfour Stewart's "Lessons in Physics." One of the small articulated wooden figures used as models in drawing is very useful for illustrating the above rule. Its right arm may be stretched out sideways at right angles to the body, and it may then be held close to the wire in various positions; paper arrows being tied to the latter, to mark direction of current.

Eton College H. G. MADAN

Halos

As the atmosphere appears recently to have reassumed in a marked degree some of the peculiar conditions which pertained to it during the time of the great sun-glows, I have thought it worth while to send you notes from my diary of some effects observed by me:—

June 14.—Between 10 and 11 a.m. Complete solar halo of a coppery colour. It lasted more or less distinctly for some time, and gradually faded. I saw no trace of mock suns.

June 23.—Between 10 and 10.30 p.m. there was a curious pearly green light in the north-north-east, and some peculiar pearly green clouds (?) floated from north to west. At first I thought this was an auroral display, but probably it was due to the same cause as the "glows."

June 15, 23, 30, July 1, 2, and 3.—After-glows of the usual pinkish hue. J. H. A. JENNER

4, East Street, Lewes, July 3

The Microscope as a Refractometer

I HAD no idea that the short paper you did me the honour to print on this subject would have led any one to suppose that a claim was made for the discovery of a new principle in physics, or that the microscope was to be used for the first time in questions on refraction.

In so short a space it was impossible to tell over again the tale of progress in this branch of physical optics, and to signalise every worker in the field by name. So much has already been done in the perfecting of optical instruments, that the utmost one can now hope to do is, by a slight improvement here and there, to render them still more serviceable.

All that was claimed as new in my paper of June 17 was—

(*a*) The use of the marked slip, structure of cell, superposed cover-glass.

(*β*) The measurement of the linear distances between the images by a finely graduated "fine adjustment" screw.

(*γ*) The use of an objective of high amplifying power (a 1/20-inch homogeneous immersion may be used if the shoulder-pieces of the cell are made with talc, and the cover-glass very thin).

It is of course possible that one or all of these details is not new; but, in spite of the authorities quoted by Dr. Gladstone to show the previous employment of the microscope in questions of refraction, I still maintain their claims to novelty to be valid; and, even supposing they are not new (which has yet to be shown), my greatest offence is that of independently arriving at a previously known method. And, considering the attention that our most eminent physicists have bestowed upon the subject, the wonder is that this has not more frequently been the case.

As to the efficiency of the method, the only objections urged against it by Dr. Gladstone are: (1) its results cannot be relied upon beyond the third decimal figure; (2) the temperature of the drop of fluid under examination cannot be taken.

As to the first objection, if we take μ_1, μ_2 as the tabulated indexes of refraction of two known substances, δ as representing the difference of distance between the images of the marks viewed through them, and measured by the fine adjustment, μ and d the corresponding symbols for the fluid under examination, we have the following equation to determine μ:—

$$\frac{\mu_2 - \mu_1}{\mu - \mu_1} \times \frac{\mu}{\mu_2} = \frac{\delta}{d}.$$

And I see no more reason to limit the exactness of this to the third decimal figure than in the formula used with the hollow prism. Moreover, if a vernier is attached to the fine adjustment the result may be relied upon with still greater accuracy.

(2) As to the temperature. In the case of most fluids this may be taken from the bottle containing the fluid; no grave scientific error will arise from the difference in temperature of a drop of fluid in contact with glass on the stage of the microscope and the same fluid in a glass bottle by its side. In the case of ethers, &c., the cell may be temporarily sealed.

As to the practical use of the method, the opinion of so known an expert as Dr. Gladstone is of the greatest weight, but as any recognition of the novelty of my method escaped acknowledgment in his notice, I may still hope that its practical use escaped observation also. So thin a stratum of fluid is employed that the index of refraction of black ink may be obtained, a result which would puzzle any one to arrive at who restricted himself to the use of the hollow prism.

That the microscope has been previously used for experiments in refraction no one ever doubted; if Dr. Gladstone, before writing, had had the time to go step by step through my method, he could scarcely have refrained from acknowledging that in its essentials it was hitherto unpublished.

GORDON THOMPSON

St. Charles's College, Notting Hill, July 3

The Bagshot Beds

As you have given publication (NATURE, July 1, p. 210) to the abstract of the paper recently read by Messrs. Monckton and Herries before the Geological Society, in which they assert that their object was to "disprove" the view lately propounded by me, as to the relation of the Bagshot Beds of the London Basin to the London Clay, perhaps you will kindly afford me space to point out to the readers of NATURE (1) that these authors have ignored, in dealing with the question, whole chapters of the evidence upon which my view is based—evidence which is continually accumulating, as two forthcoming papers (one in the press for the *Proc.* Geol. Assoc., the other in the hands of the editor of the *Geol. Mag.*) will make manifest enough; (2) that in directing their attention merely to sections at the outcrop of the beds they have added little, if anything, substantially, to that on which the old view was based, while the lithological distinctions of the Upper and Lower Bagshot Beds (where the latter have been for ages undergoing oxidation) are not sufficiently marked to furnish, in disconnected sections, evidence which can be anything more than, to say the least, equivocal. A. IRVING

Wellington College, Berks, July 3

The Enemies of the Frog

IN connection with this subject the following incident may be of interest to some of your readers. One day, near the kitchen area, an unusual noise was heard: it seemed like the mewing of a cat combined with a well-sustained whistle. On going to the spot, it was found that the noise proceeded from a cat and a frog, but it was difficult to decide from *which* of the two. Every time the cat touched the frog the sound was produced and the frog hopped away. The cat exhibited in his attitudes and motions a sort of enjoyment mingled with awe. He would just touch the frog very gently with the tips of his paws, then watch it most attentively, and when the frog would emit its peculiar loud squeak—not the usual croak—he would give a sudden bound, as if both surprised and amused; but he never

© 1886 Nature Publishing Group

attempted during the whole of the proceedings, which lasted about a quarter of an hour, to bite the frog. The frog was removed quite uninjured, but apparently exhausted either by fear or by muscular exertion. T. MARTYR

St. Joseph's College, Clapham, S.W.

Hybrids between the Black Grouse and the Pheasant

IN Yarrell's "British Birds," 4th ed. vol. iii. p. 69 *seq.*, a number of hybrids between the cock pheasant and the gray hen are enumerated as having occurred in England. Being desirous to give a life-sized and coloured figure of such a hybrid in my forthcoming work on the black grouse, the capercailzie, and their allies, I wish to borrow a specimen for a short time, and, as my endeavours to procure one have so far been unsuccessful, I beg to make this known through your widely read journal, hoping that some fortunate possessor may be kind enough to communicate with me concerning his willingness to lend me a specimen for the said purpose. A. B. MEYER

Royal Zoological Museum, Dresden, July 5

THE FINSBURY TECHNICAL COLLEGE CONVERSAZIONE

THE annual *conversazione* given by the students of the above College as the closing event of the session came off on Friday evening, July 2, and proved in every way a success. The large number of interesting objects brought together for exhibition certainly speaks well for the activity of the various committees which were intrusted with the work of organisation, and at the same time indicates how widely spread is the interest shown in the welfare of the College by the different firms of manufacturers who contributed to the exhibition. The electrical department exhibited in action most of the apparatus used for educational purposes in the College. In this department also were exhibits of apparatus and models by Messrs. Woodhouse and Rawson, the Electric Apparatus Company, Messrs. Mayfield's vacuum-tubes, and other electrical and physical apparatus made by this firm. The exhibits in the chemical department were especially numerous and representative of chemical technology in most of its branches. In the way of apparatus Messrs. Cetti, of Brooke Street, exhibited barometers, thermometers, vacuum-tubes, &c.; Messrs. Townson and Mercer showed a new carbonic acid generator, Schutzenberger's gas apparatus, filter pumps, nickel crucibles and basins, Pasteur flasks, inland revenue stills, Abel's petroleum testing apparatus, &c.; and Mr. B. Redwood lent a set of viscometers. Fine chemicals were exhibited by Messrs. Hopkin and Williams, and a splendid set of alkaloids and other products by Messrs. Howard of Stratford. Messrs. Pontifex and Wood exhibited sets of pigments and the materials used in their manufacture, Mr. C. Richardson a set of specimens illustrating the manufacture of cements, Mr. Ashley samples of English and foreign lubricating oils, and Messrs. J. and L. Cripps the materials and finished products representing the manufacture of size, glue, and gelatine. Glass manufacture was represented by a set of tools and specimens from the Whitefriars glass-works (Messrs. Powell). Messrs. Field showed a fine series of waxes and other materials used in candle-making, and a good exhibition was made also by Price's Patent Candle Company. The manufacture of soap was illustrated by a very complete set of specimens contributed from Messrs. E. Rider Cook's works at Bow and by Messrs. Knight, &c. Cotton seed and its products were shown by Messrs. W. and W. H. Stead of Blackwall and Liverpool. The specimens and diagrams sent by Gaskell, Deacon, and Co., of Widnes, gave an excellent idea of the alkali manufacture in this country.

The collection of coal-tar products was especially rich, specimens having been sent by the Badische Company, the Hoechst Colour Works, Messrs. Brooke, Simpson, and Spiller, the British Alizarine Company, and Messrs. Burt, Boulton, and Haywood. The latter firm exhibited a splendid model of their timber creosoting plant. Amongst other tar products was a set of preparations of the new sweetening substance, saccharine, sent by Dr. Fahlberg. The Broadburn Oil Company showed a very complete set of shale products. The sugar industry was represented by a set of polarimeters, models and specimens, exhibited by Mr. Newlands of the Clyde Wharf Sugar Refinery, and by the Beetroot Sugar Association. In the course of the evening Prof. S. P. Thompson gave a lecture on waves of light and Mr. John Castell-Evans discoursed on explosives. The entertainment was on the whole highly creditable to the College, and many of the firms who sent objects for exhibition have signified their approval by presenting their exhibits to the establishment as lecture specimens.

THE RECENT DISCOVERIES AT TIRYNS[1]

THE excavations made during the last two years at Tiryns, by Dr. Schliemann and Dr. Dörpfeld, have thrown new light on what has been hitherto an almost unknown period of Greek history—that far-off time, more remote even than the age of the Homeric poems, when Hellenic civilisation had not yet emerged from its Oriental cradle, nor developed its highly cultured systems of social and political government out of the splendid but semi-barbarous tyrannies of Western Asia Minor.

The literature of Greece has made us familiar with the later times, when the individual was for the most part merged in the State, and when the wealth and artistic skill of each city was devoted to public uses, such as the Council-chamber, the Agora, or the stately temples of the gods, rather than to the luxury of any one person.

But at Tiryns a very different picture is presented to us: we see a single autocratic chieftain, ruling in a sort of feudal state, and occupying a magnificent palace, surrounded by the humbler dwellings of his circle of retainers; while, instead of the utmost resources of the architect, the sculptor, and the painter being lavished on the shrine of the presiding deity, a mere open-air altar is dedicated to the god, and it is the chieftain's house which is decked out with the splendours of gilt bronze, marble sculpture, and painted walls.

The rock in the marshy plains of Argolis, on which stands the citadel of Tiryns, is about three miles distant from the Gulf of Nauplia, and commands an extensive view reaching from Argos, with its rich olive-groves, to Mycenæ on its lofty crags, and, between the two, the once prosperous sea-port of Nauplia, by the blue waters of its sheltered bay.

The massive fortification wall which surrounds the Tirynthian Rock was an object of wonder and admiration in the earliest historic times of Greece: its enormous stones keenly aroused the Greek imagination, and created legends which attributed them to mysterious Cyclopean builders, and peopled the walls with the demi-gods of the heroic age, such as Perseus and Heracles, whose early youth was fabled to have been spent in the Tirynthian city—the *Τίρυνς τειχίοεσσα* of Homer's "Iliad." This wonderful wall, some stones of which are no less than 11 feet long and 4 feet thick, was originally nearly 50 feet high at its loftiest part, measuring from its base outside: inside the city the height was very much less, as its lower part acted as a retaining wall, which kept up the loose earth which formed a level interior surface above the irregular contour of the rock.

The southern part of the Acropolis wall, where it incloses the great palace, is a very complicated structure,

---

[1] "The Prehistoric Palace of the Kings of Tiryns." The results of the latest excavations, by Dr. Henry Schliemann. The preface by Prof. F. Adler, and contributions by Dr. Wm. Dörpfeld. With 188 woodcuts, 24 plates in chromolithography, 1 map, and 4 Plans. (London: John Murray, 1886).

© 1886 Nature Publishing Group